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Do Physicians Respond to Their Peers' Treatment Styles? A Case Study of Cesarean Section in Virginia

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Abstract

Evidence of geographic variations in healthcare utilization is widespread. Even upon accounting for differences in population age and other traits, healthcare spending per capita and the use of certain healthcare treatments is substantially higher in some areas than others. Moreover, differences in healthcare spending and utilization across areas show little relation to differences in health outcomes. One potential explanation for these geographic differences in healthcare use is peer influence, or the idea that an individual physician's treatment style is affected by that of his or her peers. To understand the degree to which physicians are influenced by the way their peers practice medicine, this study analyzes deliveries in Virginia from 2012 to 2014. The study measures each physician's "treatment style" in a given year as her risk-adjusted propensity to perform cesarean section on her patients in that year. This study then examines the extent to which an individual physician's treatment style is affected by the average treatment style of the physicians in her peer group. The main finding is that there are strong positive correlations between individual physicians' treatment styles and those of their local and regional peers. Future work is needed to establish whether peers' treatment styles have a causal effect, whether physicians choose peers who are similar to them, or whether some unobserved third factor drives this correlation.

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Fielding is a 2016 Schroeder Center-Brock Institute (SC-BI) Health Policy Research Fellow. Under the SC-BI Fellowship Program, students from William & Mary and medical students from Eastern Virginia Medical School were competitively selected to conduct independent research studies focused on health policy issues in Virginia. This policy brief is drawn from that research. Jennifer Mellor, Ph.D., Director of the Schroeder Center for Health Policy, served as the William & Mary faculty mentor on this project.

Policy Brief by Matt Fleischer (M.P.P., Class of 2018)

Fleischer is a first-year William & Mary public policy graduate student, who graduated from Virginia Tech in 2016 with a B.S. in statistics. As a graduate research assistant at the Schroeder Center, Fleischer wrote this policy brief, with editorial assistance from Schroeder Center staff, based upon Fielding's research and initial report.

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Policy Relevance

Background

Even upon accounting for differences in population age and other traits, rates of utilization for some types of healthcare are substantially higher in some areas than others.¹ Patterns of geographic variations are of particular concern to policymakers looking for ways to make public programs more cost effective, especially since research shows that areas with high healthcare spending do not appear to have better measures of care quality.² Determining the cause of these geographic variations has the potential to lead to policies that lower healthcare utilization and reduce public and private medical expenditures without lowering the quality of care or worsening patient health.

One possible explanation for geographic variation is that physicians differ in their practice styles. As Birkmeyer et al. write, physicians may have "differing attitudes and beliefs about the indications for surgery."³ For example, physicians may vary in their assessment of the risks or rewards associated with a given procedure. This may be particularly likely when there is uncertainty in clinical guidelines regarding treatment. These beliefs, attitudes, and assessments contribute to differences in physician practice style or treatment style. These treatment style differences may be influenced by a variety of different factors, including regional trends, payment incentives, residency programs, experience, practice guidelines, and the malpractice environment.^{4,5,6} This study examines whether peer influence ought to be added to that list. In other words, this study seeks to discern if communication and interaction with peer physicians is associated with a given physician's own treatment decisions.

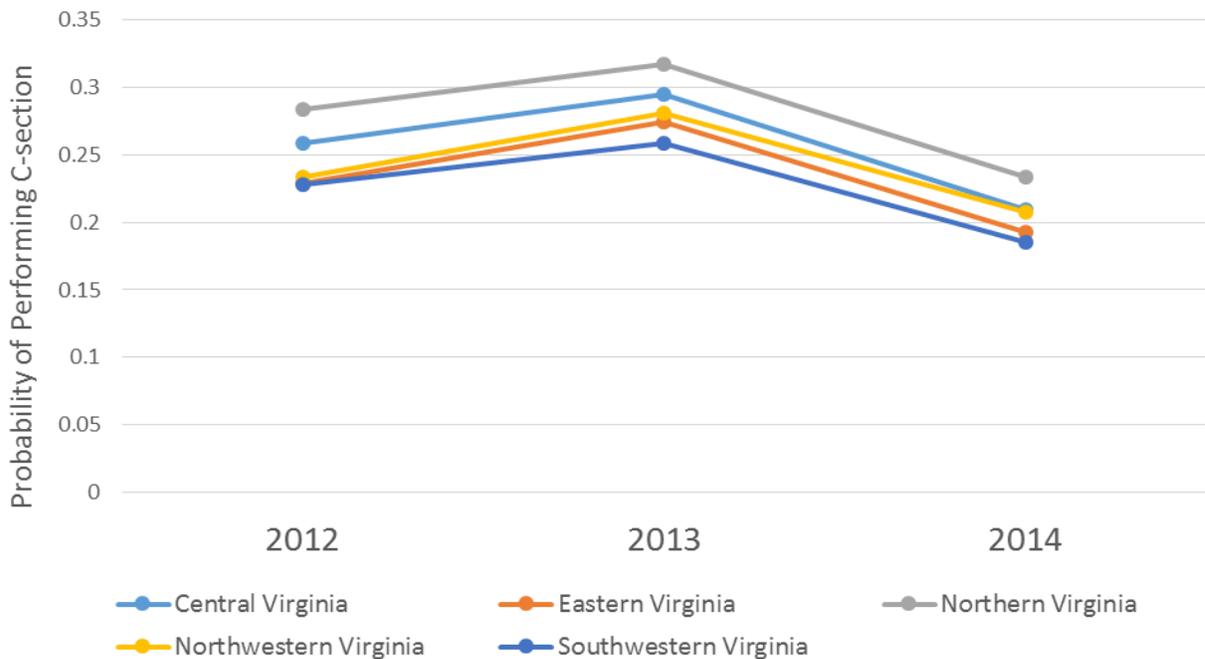
Previous studies have suggested that physicians are influenced by their peers in the treatment of certain conditions and in some contexts. In most of these prior studies, "treatment style" is measured as an individual physician's probability of choosing to provide one specific treatment from a set of alternatives, and "peer influence" is measured as the relationship between individual physicians' treatment styles and the average treatment styles of their peers. For example, a study by Epstein and Nicholson found that peer group treatment style has a small but significant effect on the probability that Florida physicians performed a cesarean section on their patients undergoing delivery between 1992 and 2006.⁷ Yang and colleagues also found that peer group treatment style has a small but significant effect on the probability that Taiwanese physicians prescribed antipsychotic drugs to their schizophrenia patients between 1997 and 2010.⁸ In a related study, Burke and colleagues found evidence of geographic variation among the practice styles of Florida physicians who treated patients with heart disease, and the authors attributed part of this variation to peer influences on practice patterns.⁴

Why Use C-Sections to Measure Peer Influence?

This study uses the same methodological approach and examines the same measure of healthcare utilization as the Epstein and Nicholson study noted above.⁷ Specifically, both this study and the Epstein and Nicholson study ask whether peers' treatment styles exert an influence on the propensities of physicians to perform c-sections on patients undergoing delivery. This study examines data on physicians performing deliveries in Virginia hospitals between 2012 and 2014.

The propensity to use c-section exhibits the type of geographic variation noted earlier. In Virginia, there is noticeable variation in the average propensity to perform c-sections across the five Health Planning Regions, which are the largest health administrative jurisdictions within the state as designated by the Virginia Department of Health. This variation is shown in the figure below. For example, the propensity of physicians to perform c-sections in Northern Virginia is greater than that of physicians in Southwestern Virginia. The existence of peer effects across Virginia could explain part of the observed variation in treatment styles across regions. To explore this, this study examines if peer group practice style is associated with an individual physician's propensity to perform c-sections on his or her patients.

**Mean Adjusted C-Section Treatment Rate
Across Virginia Health Planning Regions, 2012-2014**



Data and Sample

This study uses Virginia Health Information's (VHI) patient level data from 2012 to 2014.⁹ The patient level data are unique patient discharges. From the full set of patient discharges, this study selects the sample of 277,599 discharges associated with a delivery and occurring at non-federal, short-term acute-care hospitals in the state. Each discharge record includes the mother's age, race/ethnicity, and source of insurance. Additional clinical codes convey information about the mother's primary diagnosis, secondary diagnoses, and procedure codes that can be used to specify whether the baby was delivered vaginally or via c-section. The records also include a unique physician identifier that is consistent over time and a unique consistent hospital identifier, as well as the quarter and year the patient was discharged. The dataset includes information about the deliveries performed by a total of 826 physicians who performed deliveries for at least two consecutive years between 2012 and 2014.

Methodology

Measuring Physician Treatment Style

The first step in the analysis is to use the individual patient records to estimate a linear probability model of whether the delivery was a c-section or not. The model controls for a variety of maternal characteristics, including age, race, payer, and health characteristics relevant to the physician's treatment decision. The full set of characteristics are defined from the clinical codes on the discharge record following Gregory and colleagues.¹⁰ The results from this model are used to obtain, for each physician in the dataset, a physician "fixed effect," or his or her risk-adjusted propensity to perform a c-section in a given year.

Measuring Peer Group Treatment Style

To measure peer effects, this study defines two types of peer groups, similar to Epstein and Nicholson.⁷ A given physician's *local peer group* in a given year is defined as all other physicians who performed deliveries in the given physician's hospital during that year. A given physician's *regional peer group* in a given year is defined as all those physicians who performed deliveries in the given physician's Health Planning Region during that year, except for those who delivered at that physician's hospital (i.e., those in the local peer group).

Once peer physicians are identified, the peer group's propensity to perform c-sections is calculated. This calculation takes the average of the individual physician fixed effects described above for all physicians in the peer group. An average is calculated for the local peer group, and then separately for the regional peer group. In taking this average, each peer group member's propensity to perform c-sections is weighted by the physician's share of the total deliveries in the group. For example, if a given physician performed 10 deliveries out of the 100 total delivered performed by the members of the peer group, the

physician's weight would equal $10/100 = 0.1$. This weighting is performed to reflect the prominence of each physician's style within peer groups.

Modeling the Relationship Between Physician and Peer Group Practice Styles

Using these peer group definitions, this study constructs two models. Model A examines the relationship between the change in an individual physician's propensity to perform c-section over a two-year period and the change in the weighted-average propensity to perform c-section among physicians in the local peer group. As such, Model A illustrates the correlation of an individual physician's treatment style with that of his or her peers, without controlling for region-wide trends. Model B, on the other hand, also includes the change in the weighted-average treatment styles of both the physician's local peer group and his or her regional peer group. Accordingly, Model B therefore captures the effects of region-wide trends. Both models are estimated with two years of data for each physician. The estimated coefficients can be interpreted as showing the association between changes in the peer group propensity over time and changes in the physician's propensity to perform c-section over time.

Results

Model A suggests that there is a significant association between an individual physician's propensity to perform c-section and the propensity to perform c-section among the physician's peers. Specifically, if the peer group has a higher propensity to use c-section, the individual physician also has a higher propensity to perform c-section. Model B shows that there is a significant association between an individual physician's propensity to perform c-section and *both* the local and regional peer groups' propensity to perform c-section. These results are largely consistent with those found by Epstein and Nicholson.⁷ The coefficients for each model are summarized in the table below:

Peer Effects Calculated by Models A and B (Coefficients and Standard Errors)

	Model A (No control for region-wide trends)	Model B (Controls for region-wide trends)
Change in local peer group rate	0.368 (0.114)	0.425 (0.117)
Change in regional peer group rate		0.257 (0.117)
Year indicator	-0.056 (0.013)	-0.027 (0.018)
Constant	0.022 (0.006)	0.011 (0.008)
N	1,648	1,648
Adjusted R squared	0.1331	0.1351
Mean of dependent variable	-0.0091	-0.0091

Standard errors of coefficient estimates are in parentheses.

The table shows the peer effects calculated by each model. Model A shows that a 1 percentage point increase in the local peer group's propensity for c-sections is associated with a 0.368 percentage point increase in an individual physician's propensity to perform c-sections. Similarly, Model B shows that a 1 percentage point increase in the local peer group's propensity for c-sections is associated with a 0.425 percentage point increase in an individual physician's propensity to perform c-sections. Additionally, Model B shows that a 1 percentage point increase in the local peer group's propensity for c-sections is associated with a 0.257 percentage point increase in an individual physician's propensity to perform c-sections.

These results suggest that there is a direct link between a physician's practice style and the practice style of his or her peer group. For several reasons, however, this link should not necessarily be interpreted as evidence that peer group treatment styles have a *causal* effect on an individual's treatment style. First, all physicians who work at a hospital may be subject to hospital-wide policies that affect treatment style, and this may explain the positive association. Second, the individual physician may affect the treatment styles of her local peers even as her peers are affecting her treatment style, a problem known as simultaneity bias. Finally, physicians with similar characteristics, such as the residency program they attended, may tend to join the same hospital; if these similar characteristics cause them to have similar treatment styles, these measurements would be subject to self-selection bias. Additional research is needed to explore the potential for these types of biases among Virginia physicians.

Conclusion

Geographic variation in healthcare utilization is an important issue for policymakers to understand. Knowledge of the factors that drive geographic variation in healthcare spending could lead to the development of policies that lower public and private expenditures on healthcare without reducing the quality of care or worsening health outcomes. While this study provides evidence of strong positive correlations between an individual physician's decisions and those of her local and regional peers, it does not establish a causal relationship with respect to local peers. As such, it does not entirely attribute geographic variation to peer influences in treatment style. Therefore, continued study in this area would likely consider alternative methodologies to more definitively establish causal relationships or perhaps alternative hypotheses of geographic variation.

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